

1 **IN THE CLAIMS**

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3 Please add the following new claims:
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5 --90. A time-of-flight mass spectrometer (TOFMS), wherein said TOFMS comprises:

6 a source region including a sample holder and at least one electrode disposed
7 therein;

8 means for generating ions from said sample holder;

9 an ion reflector, said reflector being energized;

10 means for accelerating said ions orthogonally from said source region into a

11 drift region of said TOFMS toward said ion reflector; and

12 an ion detector remote from said ion reflector for detecting said accelerated

13 ions such that mass to charge ratios of said accelerated ions may be

14 determined;

15 wherein a first potential is applied to said sample holder to accelerate said ions toward
16 said means for accelerating;

17 wherein said reflector reflects said ions toward said detector; and

18 wherein the time spread in the time of flight of ions of a predetermined mass to charge
19 ratio generated within said source region to the means for detecting is minimized.
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1 91. A TOFMS according to claim 90, wherein said means for accelerating comprises a
2 pair of electrodes.

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4 92. A TOFMS according to claim 91, wherein said pair of electrodes comprises at least
5 one plate and at least one grid.

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7 93. A TOFMS according to claim 91, wherein at least one potential is applied to at least
8 one of said electrodes such that an electric field is generated within said means for
9 accelerating.

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11 94. A TOFMS according to claim 91, wherein said ions generated in said source region
12 have an initial velocity component parallel to a surface of said electrodes of said means for
13 accelerating.

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15 95. A TOFMS according to claim 91, wherein said ions generated from said sample
16 source have a first initial velocity component perpendicular to said sample holder and a
17 second initial velocity component parallel to said electrodes of said means for accelerating.

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19 96. A TOFMS according to claim 90, wherein said ions have an initial velocity
20 component perpendicular to said sample holder.

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1 97. A TOFMS according to claim 90, wherein said ions are desorbed from a surface of
2 said sample holder.
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4 98. A TOFMS according to claim 90, wherein a voltage pulse is applied to said detector
5 to increase the gain of said detector.
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7 99. A TOFMS according to claim 90, wherein said ions are continuously generated in
8 said source region.
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10 100. A TOFMS according to claim 90, wherein said ions have a non-isotropic initial
11 velocity distribution.
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13 101. A TOFMS according to claim 90, wherein said ions have an average initial velocity
14 distribution not equal to zero.
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16 102. A TOFMS according to claim 90, wherein said ions have an average initial velocity
17 component greater than zero.
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19 103. A TOFMS according to claim 90, wherein said TOFMS further comprises a
20 deflector to deflect unwanted ions from the ion path.
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1 91 104. A TOFMS according to claim 90, wherein said means for generating said ions is
2 9dd selected from the group consisting of fast atom bombardment, matrix assisted laser
3 desorption, plasma desorption, secondary ion generation, and electron bombardment.
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5 105. A TOFMS according to claim 90 wherein said ions are generated from a sample
6 selected from the group consisting of a protein and DNA.
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1 91 106. A method of improving mass resolution in time-of-flight mass spectrometry, said

2 90d method comprising the steps of:

3 establishing a first electric field in a source region that includes a sample

4 holder;

5 ionizing a sample proximately disposed to said sample holder to form sample

6 ions;

7 establishing a second electric field in an accelerating region;

8 energizing an ion reflector spaced apart from the first element; and

9 detecting said sample ions at an ion detector such that mass to charge ratios

10 of said sample ions may be determined;

11 wherein said first electric field accelerates said sample ions from said sample holder

12 toward said accelerating region;

13 wherein said second electric field accelerates said sample ions from said sample

14 holder toward said reflector; and

15 wherein the time spread in the time of flight of said sample ions of a predetermined

16 mass to charge ratio generated within said source region to said ion detector is minimized.

18 107. A method according to claim 106, wherein said accelerating region is defined by a

19 pair of parallel conducting electrodes.

1 108. A method according to claim 107, wherein said pair of electrodes comprises at least
2 one plate and at least one grid.

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4 109. A method according to claim 107, wherein at least one potential is applied to at least
5 one of said electrodes to create said second electric field.

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7 110. A method according to claim 107, wherein said ions generated in said source region
8 have an initial velocity component parallel to a surface of said electrodes.

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10 111. A method according to claim 107, wherein said ions generated in said source region
11 have a first initial velocity component perpendicular to said sample holder and a second initial
12 velocity component parallel to a surface of said electrodes.

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14 112. A method according to claim 106, wherein said ions have an initial velocity
15 component perpendicular to said sample holder.

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17 113. A method according to claim 106, wherein said ions are desorbed from a surface of
18 said sample holder.

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20 114. A method according to claim 106, wherein a voltage pulse is applied to said detector
21 to increase the gain of said detector.

1 115. A method according to claim 106, wherein said ions are continuously generated in
2 said source region.
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4 116. A method according to claim 106, wherein said ions have a non-isotropic initial
5 velocity distribution.
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7 117. A method according to claim 106, wherein said ions have an average initial velocity
8 distribution not equal to zero.
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10 118. A method according to claim 106, wherein said method further comprises the step of:
11 deflecting unwanted ions from the ion path.
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13 119. A method according to claim 106, wherein said ions are generated from a sample
14 selected from the group consisting of a protein and DNA.
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1 120. A method of operating a time-of-flight mass spectrometer (TOFMS) having a first
2 region including a sample source disposed therein, and flight tube region including an ion
3 detector, said method comprising the steps of:

4 generating ions from a sample source within the first region;

5 establishing an ion accelerating field within the flight tube region, said ion

6 accelerating field accelerating said ions generated within the first

7 region toward the ion detector; and

8 detecting said accelerated ions at the ion detector and determining the mass

9 to charge ratios of said accelerated ions.

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11 121. A method according to claim 120, wherein said method further comprises the step of:

12 energizing an ion reflector remote from said first region such that said ions

13 accelerated by said accelerating field are reflected toward said ion

14 detector.

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16 122. A method according to claim 120, wherein said ion accelerating field is established
17 across a pair of parallel conducting electrodes.

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19 123. A method according to claim 122, wherein said pair of electrodes comprises at least
20 one plate and at least one grid.
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1 124. A method according to claim 122, wherein at least one potential is applied to at least
2 one of said electrodes to create said accelerating field.
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4 125. A method according to claim 122, wherein said ions generated from said sample
5 source have an initial velocity component parallel to a surface of said electrodes.
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7 126. A method according to claim 122, wherein said ions generated from said sample
8 source have a first initial velocity component perpendicular to a surface of said sample source
9 and a second initial velocity component parallel to a surface of said electrodes.
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11 127. A method according to claim 120, wherein said ions have an initial velocity
12 component perpendicular to a surface of said sample source.
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14 128. A method according to claim 120, wherein said ions are desorbed from a surface of
15 said sample source.
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17 129. A method according to claim 120, wherein a voltage pulse is applied to said detector
18 to increase the gain of said detector.
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20 130. A method according to claim 120, wherein said ions are continuously generated in
21 said first region.

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4 131. A method according to claim 120, wherein said ions have a non-isotropic initial
5 velocity distribution.
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8 132. A method according to claim 120, wherein said ions have an average initial velocity
9 distribution not equal to zero.
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11 133. A method according to claim 120, wherein said method further comprises the step of:
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13 deflecting unwanted ions from the ion path.
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15 134. A method according to claim 120, wherein said ions are generated from a sample
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17 selected from the group consisting of a protein and DNA.
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1 135. A method of operating a time-of-flight mass spectrometer, the spectrometer having a
2 source region including a sample source disposed therein, an analyzer region including an ion
3 accelerating means and an ion detector positioned remote from the source region, said
4 method comprising the steps of:

5 establishing a non-zero field within the source region;

6 generating ions from the sample source within the source region;

7 establishing an ion accelerating field within the analyzer region after

8 establishing said non-zero field in the source region, said ion

9 accelerating field orthogonally accelerating said ions generated within

10 said source region in a path leading to the ion detector; and

11 detecting said accelerated ions at the ion detector and determining therefrom

12 mass to charge ratios of said accelerated ions.

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14 136. A method according to claim 135, wherein said method further comprises the step of:

15 energizing an ion reflector remote from said source region such that said ions

16 accelerated by said accelerating field are reflected toward said ion

17 detector.

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19 137. A method according to claim 135, wherein said ion accelerating field is established
20 across a pair of parallel conducting electrodes.
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1 138. A method according to claim 137, wherein said pair of electrodes comprises at least
2 91/c) one plate and at least one grid.
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4 139. A method according to claim 137, wherein at least one potential is applied to at least
5 one of said electrodes to create said accelerating field.
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7 140. A method according to claim 137, wherein said ions generated from said sample
8 source have an initial velocity component parallel to a surface of said electrodes.
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10 141. A method according to claim 137, wherein said ions generated from said sample
11 source have a first initial velocity component perpendicular to a surface of said sample source
12 and a second initial velocity component parallel to a surface of said electrodes.
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14 142. A method according to claim 135, wherein said ions have an initial velocity
15 component perpendicular to a surface of said sample source.
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17 143. A method according to claim 135, wherein said ions are desorbed from a surface of
18 said sample source.
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20 144. A method according to claim 135, wherein a voltage pulse is applied to said detector
21 to increase the gain of said detector.

1 91 145. A method according to claim 135, wherein said ions are continuously generated in
2 9 said source region.

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4 146. A method according to claim 135, wherein said ions have a non-isotropic initial
5 velocity distribution.

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7 147. A method according to claim 135, wherein said ions have an average initial velocity
8 distribution not equal to zero.

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10 148. A method according to claim 135, wherein said method further comprises the step of:
11 deflecting unwanted ions from the ion path.

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13 149. A method according to claim 135, wherein said ions are generated from a sample
14 selected from the group consisting of a protein and DNA.--

15 91 CONCLUDED

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